Patent **Attorney Docket No.: 2855/98**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS : Niraj MAHADEV et al.

SERIAL NO. : 10/683,927

FILED : October 10, 2003

FOR : METHOD AND APPARATUS TO PROVIDE A GMR LAPPING PLATE TEXTURIZATION USING A PHOTO-CHEMICAL PROCESS

GROUP ART UNIT : 1763

EXAMINER : Roberts P. CULBERT

M/S: APPEAL BRIEF – PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

ATTENTION: Board of Patent Appeals and Interferences

APPEAL BRIEF

Dear Sir:

This brief is in furtherance of the Notice of Appeal, filed in this case on June 18, 2007.

1. REAL PARTY IN INTEREST

The real party in interest in this matter is SAE Magnetics (H.K.) Ltd. (Recorded October 10, 2003; Reel/Frame 014614 / 0641).

2. RELATED APPEALS AND INTERFERENCES

There are no related appeals.

3. STATUS OF THE CLAIMS

Claims 1-25 are pending. Claims 21-25 were previously withdrawn from consideration. Claims 1-20 are rejected. No claims are cancelled, allowed, withdrawn, or objected to. The claims in their current form (including those claims under appeal) are presented in the Appendix – Section 8 Claims on Appeal.

4. STATUS OF AMENDMENTS

The claims listed on page A-1 of the Appendix attached to this Appeal Brief reflects the present status of the claims.

5. SUMMARY OF THE CLAIMED SUBJECT MATTER

The present invention pertains to a method and apparatus for processing slider devices for hard disk drives and the like. More particularly, the present invention pertains to lapping slider air bearing surfaces, especially for GMR type heads.

The embodiment of independent claim 1 generally describes a method of manufacturing a lapping plate comprising of selectively etching a metal plate (*see e.g.*, paragraph [0019] – Figure 3, 315) and imbedding diamond particles into said metal plate (*see e.g.*, paragraph [0020] – Figure 3, 321).

The embodiment of independent claim 3 generally describes a method of manufacturing a lapping plate comprising of applying a photoresist layer to a metal plate (*see e.g.*, paragraph [0017] – Figure 3, 305); selectively exposing areas of said photoresist layer to electromagnetic radiation (*see e.g.*, paragraph [0018] – Figure 3, 309); developing said photoresist layer; etching areas of said metal plate (*see e.g.*, paragraph [0019] – Figure 3, 315) and imbedding diamond particles into non-etched areas of said metal plate (*see e.g.*, paragraph [0020] – Figure 3, 321).

The embodiment of independent claim 11 generally describes a method of fabricating a read/write head for a disk drive, comprising of applying a photoresist layer to a metal plate (*see e.g.*, paragraph [0017] – Figure 3, 305); selectively exposing areas of said photoresist layer to electromagnetic radiation (*see e.g.*, paragraph [0018] – Figure 3, 309); developing said photoresist layer (*see e.g.*, paragraph [0018] – Figure 3, 309); etching areas of said metal plate (*see e.g.*, paragraph [0019] – Figure 3, 315); imbedding diamond particles into non-etched areas of said metal disk to create a lapping plate and lapping a read/write head with said lapping plate (*see e.g.*, paragraph [0020] – Figure 3, 321).

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Is claim 1 anticipated under 35 U.S.C. §102(b) by U.S. Patent No. 5,897,424 to Evans, hereinafter "Evans"?

B. Are claims 2-4 and 12 rendered obvious under 35 U.S.C. §103(a) over Evans in view of "*Etching in Microsystem Technology*," to M. Köhler pp.1-3, hereinafter "Kohler", and "*Machining Fundamentals*" to J. Walker, pp. 511-16, hereinafter "Walker"?

C. Are claims 5 and 13 rendered obvious under 35 U.S.C. §103(a) over Evans in view of Köhler and Walker, and in further view of Applicant's Admitted Prior Art, hereinafter "AAPA", and U.S. Patent 4,037,367 to Kruse, hereinafter "Kruse", and U.S. Patent 5,509,556 to Balz et al., hereinafter "Balz"?

D. Are claims 6 and 14 rendered obvious under 35 U.S.C. §103)a) over Evans in view of Köhler and Walker and in further view of U.S. Patent 3,291,738 to Sciambi, hereinafter "Sciambi"?

E. Are claims 7, 9, 15 and 17 rendered obvious under 35 U.S.C. §103(a) over Evans in view of Köhler, and Walker, and in further view of "*Silicon Processing for the VLSI Era*" to Wolf et al., pp. 407-409 and 529-530, hereinafter "Wolf"?

F. Are claims 10, 11 and 18-20 rendered obvious under 35 U.S.C. §103(a) over Evans, Köhler, Walker, Kruse, and in further view of U.S. Patent No. 4,821,461 to Holmstrand?

7. ARGUMENT

A. Claim 1 is not anticipated under 35 U.S.C. §102(b) by Evans.

Embodiments of the present invention refer to a lapping plate for GMR heads to be used in hard disk drives. In one embodiment, a metal lapping plate is embedded with diamond particles in non-etched areas of the metal plate.

Applicants submit the cited reference fails to teach or suggest at least a method of manufacturing a lapping plate comprising selectively etching a metal plate and imbedding diamond particles into said metal plate (*e.g.*, as described in claim 1).

With regard to the §102(b) rejection of claim 1, the Examiner relies on Col. 1, lines 10-40, Col. 3, lines 34-46 and Col. 6, lines 1-5 of Evans as showing the selective etching of a metal plate and imbedding diamond particles into the metal plate to manufacture a lapping plate. Applicants submit none of these sections refer at least to selective etching. For example, col. 3, lines 34-46 state:

> The textured lap substrate can be made from a wide variety of materials having sufficient rigidity to be used in grinding, lapping and/or polishing of selected substrates. For example, the lap substrate can be metal, ceramic, crystalline, glass-ceramic, glass, polymeric or a composite material. Suitable materials include foamed or porous silicon carbide, foamed or porous alumina (e.g., AmPorOx.RTM.), porous graphite, solid metals (e.g., aluminum, bronze, cast iron, steel, etc.) and porous metals (e.g., porous bronze), crystalline silicon, glass-ceramic (e.g., Macor.RTM.), fiber reinforced polymeric materials, metal matrix composites (e.g., silicon carbide in an aluminum matrix), whisker reinforced ceramics, etc.

The cited section discusses the materials that can be used for the textured lap substrate; for example, it discusses the use of metal, ceramic, or glass, etc. It does not describe the relevant limitations.

Next, the extensive section col. 1, lines 10-40 (included in the Background of the Invention section) simply mentions that areas can be provided that can act as reservoirs for the polishing medium and material removed from the substrate. It also describes the desired shapes of the lap surfaces and the substrate, such as flat, concave, or convex, and the general texture of the lap surface. However, it does not describe at least selectively etching a metal plate and imbedding diamond particles into said metal plate (*e.g.*, as described in claim 1).

Finally, col. 6, lines 1-5 state: "[a] wide array of polishing media can be used with the lap device according to the invention. Suitable polishing agents include: classical abrasives such as diamond, alumina, silicon carbide, boron carbide, bauxite, rouge, cerium oxide, etc.; and chemical-mechanical polishing media such as colloidal silica, colloidal alumina, chrome oxide, etc." The cited section discusses the types of polishing media that can be used. It does not teach the relevant limitations of claim 1 discussed above.

The Examiner also asserts that because Applicants state Evans teaches only that the lapping plate is to be machined or etched, that somehow Applicants recognize Evans refers to etching a selective pattern of peaks and valleys in the lapping plate. *See* Office Action dated 11/16/2006, page 2. Applicants submit this assertion is unsupported and improper. Applicants maintain there is no teaching or suggestion of at least selective etching as described in embodiments of the present application. Moreover, the Examiner refers to selective etching of peaks and valleys of lapping plate allegedly taught in Evans, but offers no citation for the teaching in the reference itself.

In order to support a proper rejection of claim 1, the cited Evans reference must teach selectively etching a metal plate and imbedding diamond particles into said metal plate. It does not, and the Examiner has failed to show that it does. Applicants submit the current rejection, including the Examiner's unsupported assertions, is inadequate to support a proper §102(b) rejection, and the §102(b) current rejection of claim 1 should be withdrawn.

B. Claims 2-4 and 12 are not rendered obvious under 35 U.S.C. §103(a) over Evans in view of Kohler, and Walker.

With regard to the §103(a) rejection of claims 2-4 and 11-12, the Examiner states that Evans teaches that it is well known to have a metal plate that has been "machined or etched to form texture or pattern that provides for the retention of polishing media or the accumulation of material removed from the surface." However, as discussed above, Evans teaches only that the lapping plate is to be machined or etched, but provides no disclosure as to how that would be accomplished. Evans fails to teach or suggest at least selectively etching a metal plate and imbedding diamond particles into said metal plate. As such, the current rejection is inadequate to support a proper §103(a) rejection of claims 2-4 and 12.

Furthermore, claims 2-4 and 12 pertain generally to the use of photoresist in an etching operation. First, Applicants would like to agree with the Examiner's assertion that the Evans reference fails to teach or suggest at least etching a pattern by applying a photoresist to a metal plate and selectively exposing areas of the resist to electromagnetic radiation, developing the photoresist, and etching areas of the materials. *See* Office Action dated 11/16/2006, page 4. In order to make up for the deficiencies of Evans, the Examiner relies on Kohler and Walker, and asserts they teach the relevant limitations of claim 2-4 and 12. *See* id. Applicants disagree for at least the following reasons.

Kohler refers to the use of photoresist in chemical blanking. Chemical blanking as shown in Fig. 28-9 of Walker is the process of "cutting out" parts from a sheet of material. In other words, rather than using a metal stamp (like a cookie cutter), chemicals are used to remove all of the metal from particular areas, leaving just the photoresist-covered areas of the sheet.

Accordingly, as indicated on p. 514, the process is not recommended for materials that are thicker than 2.3 mm and would not be useful for a lapping plate. If a proposed modification would render a device being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 U.S.P.Q. 1125 (Fed. Cir. 1984); M.P.E.P. § 2143.01.

The Examiner further asserts Walker teaches only that the process of blanking is unsuitable for etching *completely through* metal layers thicker than 2.3 mm; however, the grooves in a lapping plate are only etched to a shallow depth on the micron scale and are not etched completely through the plate, and thus would be well formed by a selective etching technique. *See* Office Action dated 11/16/2007, page 2. Applicants disagree.

As stated above and commonly understood by one of ordinary skill in the art, chemical blanking removes all of the metal from a particular area. Chemical blanking is not selective, etching, or selective etching. The Office Action's assertion that the chemical blanking technique used in Walker create grooves in a lapping plate "etched to a shallow depth … and not etched completely through" are contrary to the teachings of the reference (*i.e.,* blanking), and are not supported by any citation to the reference. Applicants submit that in order to support a proper rejection of claim 2, the Examiner must cite at least to a section where Walker teaches or suggests at least selectively etching a metal plate, applying a photoresist layer to said metal plate, and selectively removing photoresist from a surface of said metal plate. The Examiner has failed to do so, and therefore the current rejection is lacking and should be withdrawn.

Kohler is similar in that it describes the use of photoresist in microelectronics, where a metal layer in an integrated circuit or PCB is etched so as to remove all metal material in photoresist-developed areas. As in the chemical blanking example of Walker, the thickness of the metal is extremely small in Kohler (*i.e.*, 0.5 to 3 μm), and not suitable at all for a lapping plate.

The Examiner asserts only a small portion of the thickness of a lapping plate is etched to form grooves, and therefore the teachings of Kohler are suitable. *See* id. Applicants respectfully submit the Examiner misses the point. One of ordinary skill in the art will understand that the techniques taught in the Kohler reference are directed to the "sub-micrometer range" or the "10-nm-level", and are only applicable toward "extreme miniaturization". *See* Kohler, page 3. One of ordinary skill in the art will also understand the sub-micrometer or nanometer range related teachings described in Kohler are inapplicable to a scale required for a lapping plate. Applicants submit the Kohler reference as a whole is inapplicable, and fails to teach or suggest at least at least selectively etching a metal plate, applying a photoresist layer to said metal plate, and selectively removing photoresist from a surface of said metal plate. As such, the current rejection of claim 2 is lacking and should be withdrawn.

Moreover, given these differences between the polishing lap in Evans and the devices of Kohler and Walker, there is no motivation to combine the references in the manner to achieve the invention as recited in claims 2-4 and 12. The Examiner fails to meet the requirement that the suggestion to combine the references to achieve the claimed invention must come from the references themselves, and not the Applicants' specification. See M.P.E.P. § 2143.01 (esp. sec. III). Therefore, the current §103(a) rejection of claims 2-4 and 12 is lacking and should be withdrawn.

C. Are claims 5 and 13 rendered obvious under 35 U.S.C. §103(a) over Evans in view of Köhler and Walker, and in further view of AAPA, U.S. Patent 4,037,367 to Kruse, hereinafter "Kruse", and U.S. Patent 5,509,556 to Balz et al., hereinafter "Balz"?

The remaining references fail to make up for the deficiencies of Evans, Kohler and Walker. Kruse is directed to a rotary grinding tool adapted for flowing liquid film; it does not refer to at least the recited etching steps of the rejected claims. *See* Abstract. Balz describes a process for forming apertures in a metallic sheet. *See* Abstract.

As stated in the Background section of the present application (AAPA), the present invention provides for an improved lapping plate for lapping read/write head components in disk drives. As discussed in paragraph 10 of the present application there are sufficient drawbacks to using the methods described in Kruse. Balz fails to teach or suggest at least the relevant limitations discussed above as well.

Neither this paragraph nor any of the cited references, taken singularly or in combination, teaches or suggests the claimed features of manufacturing a lapping plate (*e.g.*, as described in claims 1-10), much less the method of fabricating a read/write head for a disk drive (*e.g.*, as described in claims 11-20). Since, for at least the reasons described above, claims 5 and 13 depend from allowable base claims, Applicants submit they are allowable as well and the current §103(a) rejection should be withdrawn.

D. Are claims 6 and 14 rendered obvious under 35 U.S.C. §103(a) over Evans in view of Köhler and Walker and in further view of U.S. Patent 3,291,738 to Sciambi, hereinafter "Sciambi"?

Sciambi fails to make up for the deficiencies of Evans, Kohler and Walker. Sciambi simply refers to the use of UV light to cure photoresist in the same applications as Wolfe and Kohler. *See* Abstract. It does not teach or suggest to at least the relevant features of the claimed embodiments discussed above. As such, the current rejection fails for similar reasons to those described above. Since, for at least the reasons described above, claims 6 and 14 depend from allowable base claims, Applicants submit they are allowable as well and the current §103(a) rejection should be withdrawn.

E. Are claims 7, 9, 15 and 17 rendered obvious under 35 U.S.C. §103(a) over Evans in view of Köhler, and Walker, and in further view of "*Silicon Processing for the VLSI Era*" to Wolf et al., pp. 407-409 and 529-530, hereinafter "Wolf"?

Wolfe fails to make up for the deficiencies of Evans, Kohler and Walker as well. Wolfe is similar to Kohler in that it refers to the complete removal of metal material in photoresist-developed areas and does not refer to lapping plates at all. *See* Abstract. It does not teach or suggest to at least the relevant features of the claimed embodiments discussed above. As such, the current rejection fails for similar reasons to those described above. Since, for at least the reasons described above, claims 7, 9, 15, and 17 depend from allowable base claims, Applicants submit they are allowable as well and the current §103(a) rejection should be withdrawn.

F. Are claims 10, 11 and 18-20 rendered obvious under 35 U.S.C. §103(a) over Evans, Köhler, Walker, Kruse, and in further view of U.S. Patent No. 4,821,461 to Holmstrand?

In Holmstrand, small cavities in the surface of the lapping plate are created using a glass bead blasting apparatus; it too does not refer to at least the recited etching steps of the claims. *See* Abstract.

As discussed in paragraph 8 of the present application there are sufficient drawbacks to using the methods described in Holmstrand. Neither this paragraph nor any of the cited references, taken singularly or in combination, teaches or suggests the claimed features of manufacturing a lapping plate (*e.g.*, as described in claims 1-10), much less the method of fabricating a read/write head for a disk drive (*e.g.*, as described in claims 11-20). Since, for at least the reasons described above, claims 10 and 18-20 depend from allowable base claims, Applicants submit they are allowable as well and the current §103(a) rejection should be withdrawn.

CONCLUSION

Appellants therefore respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's decision rejecting claims 1- 20 and direct the Examiner to pass the case to issue.

The Examiner is hereby authorized to charge the appeal brief fee of **$500.00** and any additional fees which may be necessary for consideration of this paper to Kenyon & Kenyon Deposit Account No. **11-0600**.

Respectfully submitted,

KENYON & KENYON LLP

Date: September 18, 2007

By:/Sumit Bhattacharya/
Sumit Bhattacharya
(Reg. No. 51,469)

KENYON & KENYON LLP
333 West San Carlos St., Suite 600
San Jose, CA 95110

Telephone: (408) 975-7500
Facsimile: (408) 975-7501

APPENDIX

(Brief of Appellants Niraj MAHADEV et al.
U.S. Patent Application Serial No. 10/683,927)
The claims in their current form (including those claims under appeal) are listed below:

8. CLAIMS ON APPEAL

1. A method of manufacturing a lapping plate comprising:

selectively etching a metal plate; and

imbedding diamond particles into said metal plate.

2. The method of claim 1 wherein said etching step includes:

applying a photoresist layer to said metal plate; and

selectively removing photoresist from a surface of said metal plate.

3. A method of manufacturing a lapping plate comprising:

applying a photoresist layer to a metal plate;

selectively exposing areas of said photoresist layer to electromagnetic radiation;

developing said photoresist layer;

etching areas of said metal plate; and

imbedding diamond particles into non-etched areas of said metal plate.

4. The method of claim 3 wherein said selectively exposing operating includes:

providing a mask between an electromagnetic radiation source and said photoresist layer.

5. The method of claim 4 wherein said mask is a wire mesh.

6. The method of claim 4 wherein said electromagnetic radiation is ultra-violet radiation.

7. The method of claim 4 wherein said photoresist is a positive photoresist.

8. The method of claim 4 wherein said photoresist is a negative photoresist.

9. The method of claim 4 wherein said etching operation is a wet-etch operation.

10. The method of claim 4 wherein said diamond particles have a diameter less than 50 nanometers.

11. A method of fabricating a read/write head for a disk drive, comprising:

applying a photoresist layer to a metal plate;

selectively exposing areas of said photoresist layer to electromagnetic radiation;

developing said photoresist layer;

etching areas of said metal plate;

imbedding diamond particles into non-etched areas of said metal disk to create a lapping plate; and

lapping a read/write head with said lapping plate.

12. The method of claim 11 wherein said selectively exposing operating includes:

providing a mask between an electromagnetic radiation source and said photoresist layer.

13. The method of claim 12 wherein said mask is a wire mesh.

14. The method of claim 12 wherein said electromagnetic radiation is ultra-violet radiation.

15. The method of claim 12 wherein said photoresist is a positive photoresist.

16. The method of claim 12 wherein said photoresist is a negative photoresist.

17. The method of claim 12 wherein said etching operation is a wet-etch operation.

18. The method of claim 12 wherein said diamond particles have a diameter less than 50 nanometers.

19. The method of claim 18 wherein said read/write head is a GMR read/write head.

20. The method of claim 18 wherein a pole tip recession for said GMR read/write head is between 2 and 3 nanometers.

21. (Withdrawn) A lapping plate comprising:

a metal plate including a plurality of etched areas, said etched areas formed from an etching operation through a developed photoresist mask; and

diamond particles imbedded into non-etched areas of the metal plate.

22. (Withdrawn) The lapping plate of claim 21 wherein said photoresist is a positive photoresist.

23. (Withdrawn) The lapping plate of claim 21 wherein said photoresist is a negative photoresist.

24. (Withdrawn) The lapping plate of claim 21 wherein said metal plate is wet-etched.

25. (Withdrawn) The lapping plate of claim 21 wherein said diamond particles have a diameter less than 50 nanometers.

9. **EVIDENCE APPENDIX**

No further evidence has been submitted with this Appeal Brief.

10. RELATED PROCEEDINGS APPENDIX

Per Section 2 above, there are no related proceedings to the present Appeal.